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(54) TIP PIECE OF LASER SYSTEM FOR TREATING BIOLOGICAL TISSUE

(57) Abstract:

FIELD: surgery; orthopedics; stomatology. SUBSTANCE: invention offers advantages due to fact that interior of tip piece of laser system for treating biological tissue contains acoustic detector which receives information of state of biological tissue to be treated. Information thus-received serves to optimize tissue treatment process conditions. EFFECT: minimum invasive action. 2 ci, 2 dwga

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(56) References cited:

1. *ЗасИБКа Ннонма* №61-16168, *!sn.!А!61 В* 17/36, 1986. 2. *flarenТ ЕВВ* N 0073617, *sn. А!61!В!17/36,!* 1983.

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(73)Proprietor: AnbTHlynep *l'pxrOpnfl* BOppxcoBMLI

(54) HAKOHE^LTHLIK JIA3EPHOYi CLICTEMb1 jji151 OBPABOTKI4
BKOJIO'LI^aTECKO1 TKAHI4

(57) Abstract:

llpeRnaraeTcsl yCTpofCTBO, KOTOpOe MO?KeT 6bITb MCHOHb3OBaHO B xapypl'MH, *opTo110AH11* M cTOMaTOHOpMM. YCTpofCTBO o6ecnetmBaeT MHHBManbHyIO BHBa3I BHOCTb M y j*i*O6CTBO npy npooej*le*HMM na3epbtx onepaum . 3Tx npeaMymecTBa RoCTUralo'c5I 6narorapsi 3aipeIn*le*H1410 BHyTpb HaKOHe^LmuKa 11a3epHo2 CMCTeMbI o6pa6oTKN 6MOTKaBM aKyCCIMeCKOpo npBeMnMKa, KOTOpblfl SIBnHeTc5I npMeMHMKOM MHdJopMaljHM o COCTORHMM 6MOHOpK^eCKOii TKAHM, Heo6xoJ*;*HMOi4 An,J;OCTM?KeHMR OITMManbHOI'O peJKMMa o6pa6oTKM. 1 3.11. 4)-nbI, 2 Mn.

Description [Onrcarn a H3o6peTea^{5a}]:

M306peTeHHe OTHOCHTCH K McJjH1HCKOI TeXHr'Ke H MOxte'r 6EITb HCIIOnb3OBaHO B xapyprzi. opTone;/HH H CTOMaTonopHH grin o6pa6crrxm MSIrKrIX H TBep.Jjbnc TKaneii.

I43BeeTeH HaKOHe⁴fiHK na3epHoro exanbneng, cojjeprxcaulgi CpeJCTBO JjocTaBxu na3epHoro H3nytleHHB go HOBepxHocTH o6pa6ammaeMoli 6HOTKarn [1] OCHOBBHM He.r OCTaTKOM JjaHHOro yCTpOICTBa \$IBn5leTC\$1 OTCTCTBHe B HCM HppHPaU,HOHHOro KaHana, a TaK}Ke epege 'rBa, no3BonBionLero OnnegeHTb BHJj o6pa6aTbIBaeMoi TKaHH.

†13BCCTeH Taxxe na3epHb11? HaKOHe⁴HHK jjnB 6opManumm, KOTOpbIrl 5IBnHeTC51 HaH6onee 6f1113KHM 110 TCXHHUCCKO2 CyIIJIOCTH H npHHCIT 3a npOTOTH [2] OTOT' HaKOHe⁴HIK cor epHcHT, 'Tome epeJjcTba JjocTaBKH na3epHoro H3nyueHHB, Cpege''Bo JjocTaBKH go nosepxnocTH o6pa6aTbIsaeMoil 6HOTKaHH opoiaiouLeii xcHgKoCTH.

OCHOBBHM HegOCTaTKOM npOTOTHna 5IBnHCTC51 OTCTCTBHe B HeM npaeMHHKa HH(4OpMaJIHH 0.cOCTOCHHHH o6pa6aTbIBaeMOLI TKaHH, HO3BOJIBIOHLeO onnejeHTb ee BHJj.

3aJjaua, Ha peineHHe KOTOpoi Hanpaseno H3o6peTeHHe, 3axnio 'iaeTeH B cO3JJaHHH yCTpoi cTba, o6ecne^{5a} aBalonLero yJjocTBO npoBe)LeHH\$ r na3epno\$ o6pa6oTKH 6HOTKann npa ojjHOBpeMCHHOM onnegeHHH BHJja m COCTOBHHI o6pa6aTbIBaeMo% 6HOTKaHH, tiro, B cBOIO Ouepe)jb, o6ecne^{5a} I14Baer MHHHManbHio HHBa3HHOCTb.

3agaua peHiaeTen npH ocylgeCTBneHHH H3o6peTeHHB 3a cuer'rexHHUecxopo pe3ynbTaTa, 3axnio 'iaioineroB B OHTHMH3aJIHH ycO6H2 npHeMa HH4opMaJIHH o COCTOBHHH o6pa6amIBaeMo2 TxaHH.

TexHHUecxafl pe3ynbTaT JjocTHraerTCB 'rem, yTO BByTpH HaxonegHHKa na3epaoai CHCTCMbi p. n o6pa6oTKH 6Honoralecxog TxaHH, COJjepr}KauLeM CpeJCTBO JjocTaBKH na3epHoro H311yueHHB H O HOBepXHOCTH 6HOTKaHH, 3aKpenneH aKyCTH 'leCKHIp HpHeMHHK, BXOJJ KOTOpO COHpb}KCH c MeCTOM B03Jje\$CTBHB Ha 6HOTKaHb, TaKytO COOTHOnellHe pacCTopHHB OT OHTHUeCKOii OCH Ha BbIXOJje HaKOHeuHHKa go BXOJLHO% HoBepxhocTH .aKyCTHueCKOro npaeMHHKa H paCCTOHHI151 OT HOBCpXHOCTH HaKOHeTHHKa B MCCTe ero OnTH'leCKOro BbIXOJja Jjo MecTa B03Jjei2CTBHB Ha 6HOTKaHb HaXOJ ITCSI B npegeanax OT 1: 5 po 4:1. 9neKTpa4eCKH2 BbIXOJj aKyCTHueCKOro npzeMHHKa cog :platen c 6HOKOM perHCTpaJIHH HOCTpe)jCTBOM 3KpaHHpOBaHHO'i O Ka6eHb.

B iiaxoHeuHHKe MO}KCT COJjeprHcaTbCB cper c rao JjocTaBKH opoiaiou.ei2 x{HJjKOCTH JJO HOBepXHOCTH 6HOTKaHH.

M3BeCTHO, 'TO 944eKTHBHOCTb na3epHoi o6pa6oTKH 6HOnOraLeCKO2 TKaHH c OJjHOBpeMCHHbIM o6ecneueHHeM 11H3KO2 JIHBa3HHBHOCTH (CTeHeHH HeKpO3a) 3aBHCHT OT JLTHHbI DOHHbI H MOHKOCT' rH Ila3epHoro H3nyueHH51, 3HeprHH H BpeMCHH na3epHoro B03JjeicTbaH H, JjJB HeKOTOpIX BHJjOB TKaHH, BKJjKOCThOro OpOHeneHB 30HbI na3epHOB o6pa6oTxaH (CM. nanpaMep, Proceeding of Laser-Tissue Interaction V 24-27, January 1994, Los Angeles, California, Vol 2134A).

MCCnejjoBauHH, npoBeJjeHHbie aITOpOM, HOKa3aHH, '4To npH 9TOM Heo6xo) HMa ogHOBpeMeHHaB onTHMH3an asi yKa3aHHbIX napameTpoB Jjn, Ka}KJjOro BHJja 6HOTKaHH.

1411bMH CIOBaMH, He06XOJjaMbI: B03MQ)KHOCTb Bb16opa OHTHManbIIX JjnHH BOnH n3nyuennii na3epOB asia Hx cMeda, perCTpaYas1 Hpoiecca na3epaoii JjeeTpyKILHH, BHJja H CoCT05111151 6HOTKaHH H yHpaBneHHB J(nIIHOI BOnHbI, MOHBIOCTbIO, 3Hepr'He2 H BpeMCHCM na3epHoro B03JjeICTBHB, cacreMa opoineHHB 30HbI na3epHo2 o6pa6oTKH.

OnTHM113aJjH51 pe)icHMa o6pa6oTin Bo3MO2KHa npH HanH 'IHH CHCTeMbI 06paTHO2 CB513H, o6ecneunBaloujeit ynpaaneHHe napamepamiH na3epHoro H3nyueHHB B 3aBHCHMOCTH OT COCTOBHHH H BHJja o6pa6aTbIBaeMoti TKaHH, T.e. Heo6xo) HM HpaeMHHK IHH4opMaJIHH o COCTO51HHI2 o6pa6aTbIBaeMo2 TKaHH, BbIXOJj KOTOpO'i O coeJjHHeH c 6HOKOM ynpaBneHHB napameTpaMH na3epHoro H3nyueHHB.

lpneMHHKOM HH4IOpMailHH 0 COCT0SIHHH o6pa6aTbIBaeMoil TKaHH MO)KCT 6bITb aKyCTH¹leCKH7 npHCMHHK 3ByKOBOYI BOTLHbI, KOTOPa5I o6pa3yeTcI B pe3yhbTaTe na3epHopo pa3pymeHH5I 6HOTKaHH.)Ina pa3TH¹mbIX TKaHeil aMI TIHTyja aKyCTMICCKO\$ BOFhbI pa3natma (CM. Renso Salimbeni "Shock wave models keep laser surgeons on target" Opt Laser Europe June. 1994, p.p. 37-39).

11pH pa3pynlemw 6HOTKa m Mex,ny Ha¹lanoM BO3AeICTBH5I na3epHopo HbnInbCa H noslwleHHeM aKyCTHecKopo cHrxana Ha6nioAaeTCI apeMeHHan 3ajep)Kxa. BenHLnra wok' 3a,rep)KKH onpe)TCTI TpeM\$1 4 aKTopaMH: pacToaHneM OT He'rowmKa 3Byxa, KOTopbIM nnnsicTci o6pnyaeMasI noaepxxocTb 6HOTKaHH, AO npHeMHHKa, perHCTpHpnyonero axycTHleCKH\$ HMInbC; HHTCHCHBHOCThIO na3epHopo H3ny¹ieHH5I Ha nobepxhocTH o6pa6amIBaeMoII TKaHH H BenWIHOII nopora ee pa3pymeHH5I.

I4CCneAOBAH5I noxa3ann, HTO aKyCTH¹leCKH4 HMnyhbC, B03HfKaOn1 f npH pa3pynleHHH 6aoTKaHH c 6onee HH3KHM nOpOpOM na3epHopo pa3pymelum, HanpHMep AeHTHHa, HMeCT MeHbBlyIO BpeMeHHyIO 3a,BepIKKH oTHOCHTenbHO nauana na3epHopo HMnyhbca, ueM aKyCTHueCKH\$. HMInbC, H03HHKaOnlaII npH pa3pymeHMI TKaHH C 6onee BbICOKHM nOpOpOM pa3pymeHHH, HanpHMep 3Manz (CM. G.B. Altshuler, A.V. Belikov, at all "Acoustic response of hard dental tissues to pulsed laser action". SPIE VOL 2080. Dental Applications of Lasers, 1993, p.p. 97-103).

TaKHM o6pa3om, HAcHTH4HKamm BHAA o6pa6aTbIBaeMol TKaHH 3aBHCHT OT TO'HOCTH H3MepeHnn BpeMeHHOI 3ajep.iKKH.

3axpenneHHe axycTHUecKopo npHeMHHKa BHyTpH HaKOHe¹IHHKa ocBo6oxc,aeT OnepallnOHHe none OT AOBOnHHTenbHbIX npHCH006neHHft, CBOANT K MHHHMMy /pnyKTya11H10 napaMe rpon npnHSITOpo alycTHUecKopo cHrHana H 3aBHCBMOCb Beml'WHbI BpeMeHHO\$ 3ajepxCKH OT MaHHnyH5ILW11 onepaTopa, a TaK)Ke 3an rngaCT aKycTnuecKHil npHeMHHK OT CarlaLIHbIX nOBpe)KAeHnYI.

fioMeujeHHe aKyCTy¹leCKOpo npHeMHHKa c 9neKTpH4CKHM BbIXOAOM BHyTpH HaKOHe¹IHHKa Bne¹leT 3a co6oii HanB¹fe B nocnejHeM HpOBOAHHKa c TOKOM. B 9TOM cnytae Heo6xo) nMo 06e30naenTb KaK na11HeHTa, TaK H onepaTopa OT Cny¹ailHO B03MO2KHbIX 3eKTPOIHOBOBIX n03AeICTBII4il. KpoMe Toro, Heo6xo3nMa noMexoyCToc¹wBaa nepejja¹la BbIXOAHHbIX CHrHanOB K 6noKy HX nepMeTpailHH. fio9TOMy CoeAHHeHHe BbIXOAa aKyCTH¹leCKOpo npHeMHHKa c 6nOKOM perHCTpau,uu ni,inoIHeno nOCpeACTBOM 3KpaHHpOBAHHOpo Ka6ena.

no CBACHHHM aBTOpa COBOKyHHOCTh H3IO¹KCHHbIX B ipOpMyTie H306eTCHH31 11p3HaKOB snBcneTcI HOBOII, a caMO TexHwecKoe peiueHHe yAOBneTBOpHeT KpHTepHO "Ii306peTaTenbCKH4 ypoBeHb".

Ha 4 nr. 1 CXeMaTH¹leCKII H3o6pa)KeH 6eKOTaKTHbIYI HaKOHe¹niHK na3epHOi CHCTeMbI jinsi 06pa6OTKH 6HOTKaHH; Ha 4Hr. 2 KOHTaKTHbII HaKOHe¹IHHK.

BeCKOITaKTHbIII HaKOHe¹IHHK *Hr. 1) COCTOHT H3 Kopnyca 1, BHyTpH KOTOPOpO paCHOITO)Klibl onrmleCKa5I CHCTeMa, COCTO5IH5I H3 OnTB¹leCKOpo BOnOKHa 2, KOnnuMIpyIOIA02 nHH3bI 3, fOBOpOTHOpO 3epKana 4 H4IOKynpyloIIleil nHH3bI 5, a TaKK)Ke BoAonponOAHAaai Tpy6Ka 6 H B03AyXOnpOBOAIIIIax Tpy6Ka 7. AKyCTH4eCKHII npHeMHHK 8 3aKpenneH BHyTpH HaKOHe¹IHHKa TaKHM o6pa3om, 5TO epO aKyCTHueCKHII BXA o6panen K MeCTy Bo3AeICTBH5I Ha 6HOTKaHb 9 (HCTO¹nmicy aKyCTH¹leCKO2 BOnHbI), a 9neKTpM¹ieCKHYI BbIXOA COeAHHeH c 6YOKOM perHCTpa11HH 10 nocpeACTBOM 3KpaHHpOBAHHOpO Ka6e II 11. flepee BXAOM aKycTHUecxopo npHeMHHKa 8 Ha nonepXHOCTH HaKOHe¹IHHKa paCHOOnO)KeHa AHacppapMa 12. Pa6otmil HHCTpyMeHT 13 (BOnOKHO HnH ca I(DRpoBbbyI CTepKem) KOHTaKTHOpO HaKOHe¹IHHKa IIOKa3aH Ha 4 nr.2. 11nn pa6oTe c HHM MeCTO B03AeICTBn5I Ha 6uoTKanb 9 yAaneHO OT nonepXhocTH HaKOHe¹IHHKa 6o1lbHle, ¹ieM HpH pa6OTe c 6eKOTaKTH,IM HaKOHe¹IHHKOM.

MeCTopacnonoxcenne aicyCTH¹ieCKOpo npHeMHHKa 8 onpe,eneHo H3 CneyIOII.IHX coo6paxceHHii.

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Y¹HTbluan, уТО HaBMеHbinee paccTonne OT ИOBepXHOCTH HaxonegHHKa go MecTa B03J4CLICTBH5I Ha 6HOTKaHb 9 MO?KeTMCHSITbCH H jvui pa3nu'HHX BHJтOB TKaHCH H o6pa6oTxx xone6neTen OT 8,5 go 20 MM, a JjIaMeTp (DoKycxpyloueti nHH3bI 5 pasen 3 MM OT onT14¹leCKO1i och 4oxycnpylonje i JHH3b1 5 no HaIpaBnemno, nepneIJ;i'iKynslpxoMy 9TO11 oex. MaxcHManbHO B03MWKHoe yganenne aKycTHUecKoro npxeMHHxa 8 oT !Accra Bo3JjeLICTBHcT Ha 6140TKallb 9 orpa1HJlBaETCSI cHH?KeHHeM ¹ryBC"TBHTerlbHOCTH Coma perrCTpan1ouBoro axycTHUecxoro cxxnana H 9KpaHHpoBaHxeM BxoJja axycTHUecxoro npneMHHxa 8 pyxoft onepaToPa H cocTaBnxer 34 MM. Y¹HTblBaH 4opMy HaKOHCH⁴ HHKa, axycTHUecKH11 npHeMHHK 8 3axpennex nepeJj 6nx7?xai mek K mealy B03AC2CTBVISI Ha TKaHb BepMEHOLI yrna H3r16a Tena HaKOHeuHHKa TaK, ¹TO1COO'tHOMeHHe paCTOSIHNSI OT onTHUecKO1 Och go BXOJjHOLI noBepXHOCTH axycTHUecKoro npxemynKa 8 H pacCTosinx OT IOBepXHOCTH HaKOH¹ HHKa B MCCTe ero OHTHUCCKOPO BbIXOga go MCCTa B03Jje1CTBHR Ha 6HOTKamb, HaxogwrCSI B npegenax OT 1:5 go 4:1.

LICCne) OBAHHn, npo ejjeHtn'le aBTOpOM, noxa3ann, ¹TO npH pacnono?KeHbIn axycxJlecxoro npHeMHHKa B yxa3aHHbxx raper enax axycTnuecxasI Bonxa, o6pa3ylonkacH npH na3epHO\$ a6nsnjxx 6HOTKaneil, vxMeer aMnnxTypy, rocTaToH yto Rnx perxCTpanxz axycTHUecKHMH npxeMHHKaMH, KpOMe TOM, B 3THX npejjenax axmnwTyr a aKycTHUecKOI BOJHbl HeCeT HH4IOpMaI *w/o* Tnne o6pa6amxaeMoil TKaHH.

gna(pparMa 12 MO?KeT 6bITb BbIHOJlHeHa 143 MeTaJlH1UeCKOLi 4)OpMbl HnH nonHMepHOR HneHHK; *pOnb* KOTOpbIX 3aKrho¹iaeTCSI B 3aJlCTe BXOJjHO1 HOBepXHOCTH aKyCTHueCKOro npaeMHHKa 8 OT pa3HeTaIOIB XCH uaCTH¹lex 6HOTKaHH 9 H 6pb13r BOJjb1, a TaxIKE cIBJIAeTCH pe3onaTopOM aKyCTHUCCKHX xone6aux14.

Ирxx npaxTHJlecxoft peanH3a1wH HaxoHeHHKa B KaueCTBe axycTHUecxoro npneMHHKa 8 Bh16paH MHKpO4OH 12HpMbl Bplonb H K'ber 4138 B KoMnnexce c npeJycanwTeneM 2633 H nepeXO) HHKOM UA 0160.

TaKHM o6pa3oM, npejnnaraeMoe ycTpOJICTBO HaKOH¹HHKa 3a cueT COBOKynHOCTH 3a5IBnS1eMbx npH3HaKOB o6ecneuHBaeT MHHHManbHyIO TpaBMaTH¹HOCTb npH npoeJ(ennn na3epHoi o6pa6oTKH 6HOnOpHueCKON TKaHH B COUeTaHHH c yjJO6CTBOM npoBepjeHHH o6pa6oTKH.

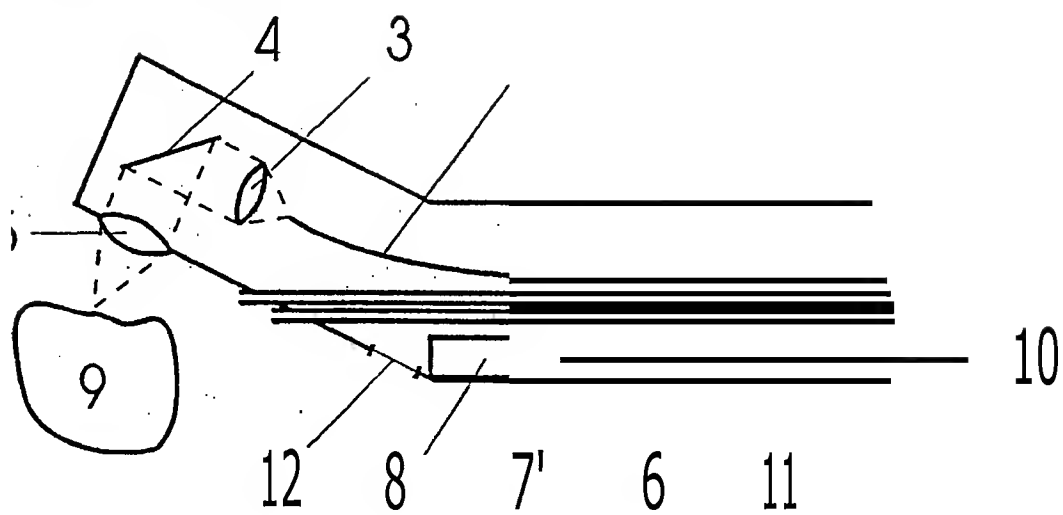
Claims [(Dopasyna H3o6peTeHHH):

1. HaXOHe^LHHK na3epnov"i cHCTelnl J;ñH o6pa6oTKH 6HonorHHecHoti TKaHH, cogepaKantnia iCpCgCTBO JJOCTaBKH na3epHoro H3ИyMCHHH go noBepxHOCTH 6HOTKaiH, OTTH^LalOnWRiiCSI 'rem, LITO BHyTpH Hero 3aipenneH axycTH^LlecKHIZ npHezHHK, BXOJ; KOTOpOpO conpH,KeH c MCCTOM BO3,HCRCTBHH Ha 6HOTKamb TaK, ^LITO COOTHOMeHHe pacce'rommH OT OHTHHeCKOI OCH Ha BbIXOJ;e HaKOHeliHHKa J;o BXOAHOH UOBCpXHOCTH axycTHLlecKOpo npHeMIndia H paCCTOHHHH OT HOBCpXHOCTH HaKOHeliHHKa B MecTe ero onTH^LlecKOpo BbIxoga go mm-1'a .BO3J;c CTBHH Ha 6HOTKaMb HaXOgHTCH B npeganax 1 5 4 1, a 3neKTpH^LlecKH7i BbIXOg cCOc 1ñCH c 6noKOM perCTpaHHH nocpegTBOM 3KpaHHpOBaHHOro Ka6eH.

2. Hasoxe'nlHK no n. 1, oTnH^LaxOIwiicH 'rem, ^LITO coj;ep]KHT cpegCTBO J;oCTaBKH •opomaiozueft KHgKOCTH go noBepxHOCTH 6HOTKaHH.

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Drawing(s) [1epTemn]:



cVlr. 1

